

CLAIMS

1. A driving method of a display panel having a plurality of scan electrodes arranged in the column direction and a plurality of data electrodes arranged in the row direction of a screen, comprising

a line sequential addressing for controlling potential of the data electrode in synchronization with row selection by individual potential control of the scan electrode, wherein,

when n-th display data as well as (n+1)th display data are different between the neighboring data electrodes and n-th display data are different from (n+1)th display data in each of the data electrodes, stored charge due to capacitance between the neighboring data electrodes is discharged by connecting one of the data electrodes to a power source line and by connecting the other data electrode to the power source line via a forward direction diode before switching the potential corresponding to the n-th display data to the potential corresponding to the (n+1)th display data.

2. A display device comprising a display panel including a plurality of scan electrodes arranged in the column direction and a plurality of data electrodes arranged in the row direction of a screen and a driving circuit for controlling potential of the scan electrodes and the data electrodes in accordance with binary display data, the display device performing a line sequential addressing to control potential of the data electrode in binary manner in synchronization with row selection by the

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scan electrode, wherein

each of the data electrodes is provided with means for controlling the potential in binary manner, which is a switching circuit of a push-pull structure including a pair of switching elements for connecting a current supply terminal of a driving power source with the data electrode and for connecting a current sink terminal of the driving power source with the data electrode and a backward current path including a diode, connected in parallel with an opening and closing path in each of the switching elements, and

fig. 10

each of the data electrodes is further provided with a signal generating circuit that gives in the addressing a first switching signal to the switching element of the current sink side, the first switching signal corresponding to a combination of display data given at every switching of the row selection and a timing signal repeating on and off by a row selection period in synchronization with the row selection and gives in the addressing a second switching signal to the switching element of the current supply side, the second switching signal corresponding to a combination of the display data and a delayed signal of the timing signal.

fig. 10

fig. 12

fig. 12

3. The display device according to claim 2, wherein the delay time of the timing signal is longer than the time necessary for discharging the stored charge due to the capacitance between the neighboring data electrodes and is shorter than the row selection period.

4. A display device screen comprising a display panel including a plurality of scan electrodes arranged in

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15

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fig. 10

fig. 12

th the row
(low potential side)

5. A display device comprising a display panel including a plurality of scan electrodes arranged in the column direction and a plurality of data electrodes arranged in the row direction of a screen and a driving circuit for controlling potential of the scan electrodes and the data electrodes in accordance with binary display data, the display device performing a line sequential addressing for controlling potential of the data electrode in binary manner in synchronization with row selection by the scan electrode, wherein

each of the data electrodes is provided with means for controlling the potential in binary manner, which is a switching circuit of a push-pull structure including a pair of switching elements for connecting a current supply terminal of a driving power source with the data electrode and for connecting a current sink terminal of the driving power source with the data electrode and a backward current path including a diode, connected in parallel with an opening and closing path in each of the switching elements, and

the on and off timings of the switching element corresponding to an odd data electrode in an arrangement are different from the on and off timings of the switching element corresponding to an even data electrode, in the addressing.

6. The display device according to claim 4, wherein a first and a second switching signals are generated, the first switching signal corresponding to a combination of display data given at every switching of the row selection and a timing signal repeating on and off by a row

fig. 10

fig. 12

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selection period in synchronization with the row selection, the second switching signal corresponding to a combination of the display data and a delayed signal of the timing signal, and

5 one of the first and the second switching signal is used for controlling the switching element corresponding to the odd data electrode, while the other is used for controlling the switching element corresponding to the even data electrode.

10 7. The display device according to claim 6, wherein the delay time of the timing signal is longer than the time necessary for discharging the stored charge due to the capacitance between the neighboring data electrodes and is shorter than the row selection period.

15 8. The display device according to claim 6, comprising an integrated circuit device for generating the first switching signal and

an integrated circuit device for generating the second switching signal which includes a circuit for
20 delaying the timing signal.

9. A display device according to claim 5, wherein a first and a second switching signals are generated, the first switching signal corresponding to a combination of display data given at every switching of the row
25 selection and a timing signal repeating on and off by a row selection period in synchronization with the row selection, the second switching signal corresponding to a combination of delayed data of the display data and the timing signal, and

30 one of the first and the second switching signal is

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used for controlling the switching element corresponding to the odd data electrode, while the other is used for controlling the switching element corresponding to the even data electrode.

5 10. The display device according to claim 9, wherein the delay time of the display data is longer than the time necessary for discharging the stored charge due to the capacitance between the neighboring data electrodes and is shorter than the row selection period.

10 11. The display device according to claim 9, comprising a first integrated circuit device for generating the first switching signal and

 a second integrated circuit device for generating a second switching signal which includes a circuit for
15 delaying the display data.

 12. The display device according to claim 2, wherein the switching element is a field effect transistor, and the diode is a parasitic diode unique to the field effect transistor for forming a switching path connected
20 in parallel with the field effect transistor.

 13. The display device according to claim 4, wherein the switching element is a field effect transistor, and the diode is a parasitic diode unique to the field effect transistor for forming a switching path connected
25 in parallel with the field effect transistor.

 14. The display device according to claim 5, wherein the switching element is a field effect transistor, and the diode is a parasitic diode unique to the field effect transistor for forming a switching path connected in
30 parallel with the field effect transistor.

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15. The display device according to claim 2,
wherein the diode is another circuit element separated
from the switching element.

16. The display device according to claim 4,
5 wherein the diode is another circuit element separated
from the switching element.

17. The display device according to claim 5,
wherein the diode is another circuit element separated
from the switching element.

10 18. An integrated circuit device for controlling
potential of a plurality of data electrodes arranged in
the row direction of a screen of a display panel in
accordance with binary display data, wherein

a plurality of switching circuits is provided, each
15 of which corresponds to each of the data electrodes,

each of the switching circuits includes a pair of
switching elements for connecting a current supply
terminal of a driving power source with a data electrode
and for connecting a current sink terminal of a driving
20 power source with the data electrode, the switching
circuit being a push-pull circuit in which a backward
current path including a diode is connected in parallel
with a switching path in each of the switching elements,
and

25 a signal delay circuit is provided for delaying the
on and off timings of the switching element of the current
supply side from the on and off timings of the switching
element of the current sink side.

19. An integrated circuit device for controlling
30 potential of a target electrode that is an odd or an even

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fig. 10

fig. 12

data electrode among data electrodes arranged in the row direction of a screen of a display panel in accordance with binary display data, comprising:

5 a delay circuit for delaying display data that are inputted in synchronization with row selection of line sequential addressing;

a logic circuit for generating a switching signal corresponding to a combination of display data from the delay circuit and a timing signal repeating on and off by
10 a row selection period; and

a group of switching circuits, each of which is provided for each of the target electrodes; wherein

each of the switching circuits includes a pair of switching elements for connecting a current supply
15 terminal of a driving power source with a data electrode and for connecting a current sink terminal of the driving power source with the data electrode, the switching circuit being a push-pull circuit in which a backward current path including a diode is connected in parallel
20 with a switching path in each of the switching elements; and

the switching element is controlled by the switching signal.